

MATHEMATICS- ALGEBRA

1. Let p, q, r be positive integers and $p + \frac{1}{q + \frac{1}{r}} = \frac{26}{21}$, which of the following is equal to $p.q.r$?

A) 18
B) 20
C) 22
D) 24

3. What is the value of $4 \times (-1 + 2 - 3 + 4 - 5 + 6 - 7 + \dots + 1000)$?

A) 0
B) 1
C) 500
D) 2000

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2. Let x, y be real numbers and $y^2 + 4y + 9x^2 - 30x + 29 = 0$, Which of the following is equal to $9x - y$?

A) 17
B) 25
C) 30
D) 41

4. The admission fee at a small fair is Tsh 1500 for children and Tsh 4000 for adults. On a certain day, 2200 people enter the fair and Tsh 5050000 is collected. How many children attended?

A) 700
B) 1000
C) 1200
D) 1500

5. Suppose that x and y are nonzero real numbers such that $\frac{2x+y}{x-2y} = -3$.

What is the value of $\frac{2x^2-4y+8}{y^2-2x+4}$?

- A) - 1
- B) 2
- C) 3
- D) 4

7. You have 20,000 shilling to spend on taxi fare. The ride costs 5,000 shilling plus 2,500 shilling per kilometer. What is the maximum whole number of kilometers you can ride for 20,000 shilling?

- A) 9
- B) 8
- C) 7
- D) 6

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6. What is the sum of values of x holding the equation.

$$(-3x - 2) - 3|x - 3| = -4(x + 5)$$

- A) 12
- B) 11.75
- C) 11.5
- D) 11.25

8. How many of the following statements are true if x is real number between 3 and 4?

$$9 < x^2 < 16, \quad 9 < 2x < 16$$
$$9 < 4x < 16, \quad 9 < x^2 - 2x < 16$$

- A) 1
- B) 2
- C) 3
- D) 4

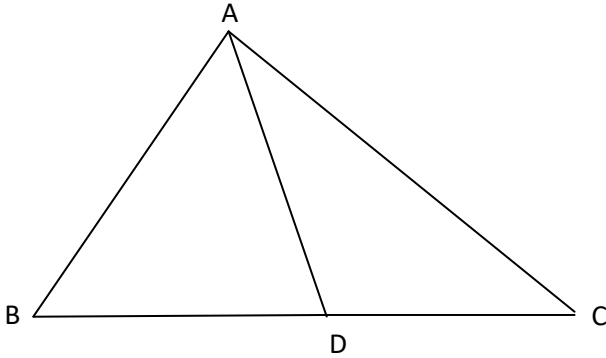
9. A father's age is one more than four times the sum of two children's age. Two years ago the father's age was one more than six times the sum of his children's age. How old is the father?
- A) 47
B) 46
C) 45
D) 44

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10. Professor Mgaye is packing up the books in his office to move to a new location. A small box can hold 26 books and a large box can hold 45 books. In total, these boxes must hold at least 504 books, which is the total number of books in the professor's office. Let x = the number of small boxes, y = the number of large boxes
Select the inequality in standard form that describes this situation in terms of x and y as inequality

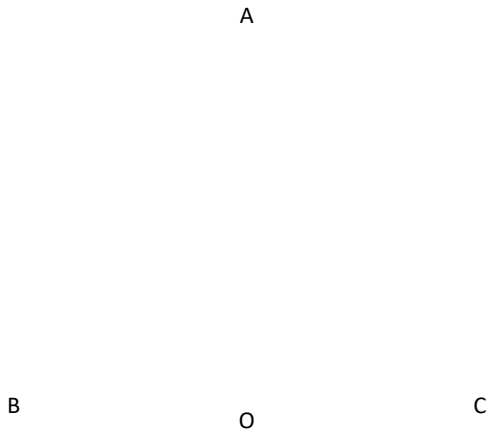
GEOMETRY

11. Given that $AD = AB = DC$, $\angle BAC = 135^\circ$, then what is $\angle DAC$?



- A) 15°
- B) 20°
- C) 25°
- D) 30°

12. Triangle ABC is an isosceles triangle with $BC=12\text{cm}$, $AO=8\text{cm}$ and point O is the center of the circle. What is the radius of the semi-circle?



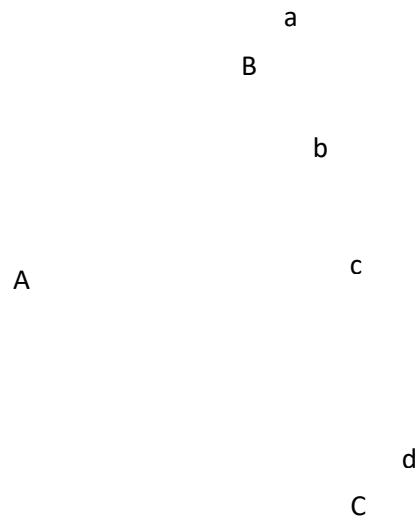
- A) 3.6 cm
- B) 4.8 cm
- C) 5.2 cm
- D) 6.4 cm

13. The sum of supplement and complement of angle x is 170° , what is the complement of angle x?

- A) 55°
- B) 70°
- C) 65°
- D) 40°

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14. Given that $a + b = 175^\circ$
 $(b - a) + (d - c) = 30^\circ$,
 what is b?

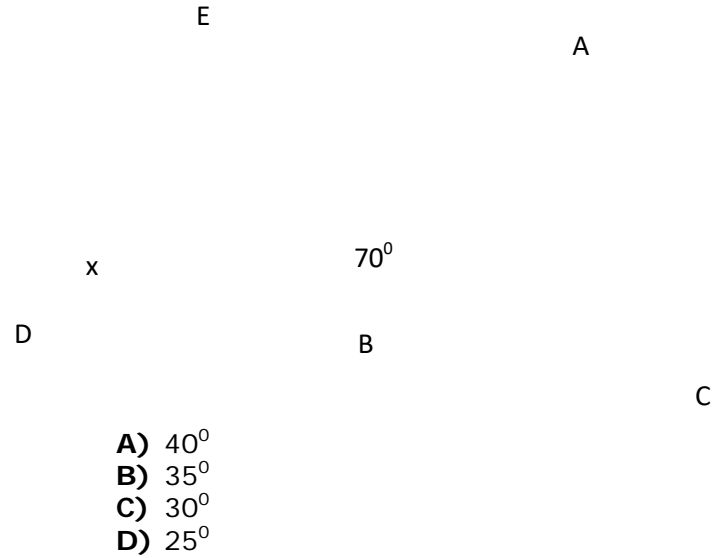


- A) 85°
- B) 90°
- C) 95°
- D) 100°

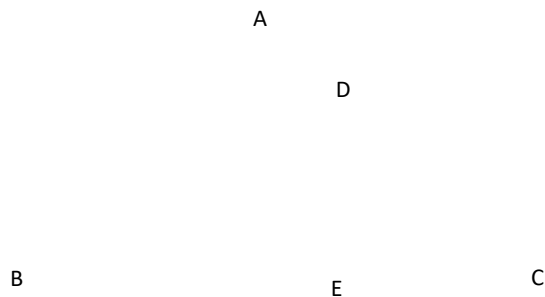
15. $d_1 : 5x - 4y + 20 = 0$
 $d_2 : 5x - 2y + 10 = 0$
 what is the area of region bounded by d_1 , d_2 and x-axis ?

- A) 3
- B) 4
- C) 5
- D) 6

17. Triangle ABC is the image of the equilateral triangle EBD upon rotation about B, where by $\angle ABE = 70^\circ$, what is the angle x ?

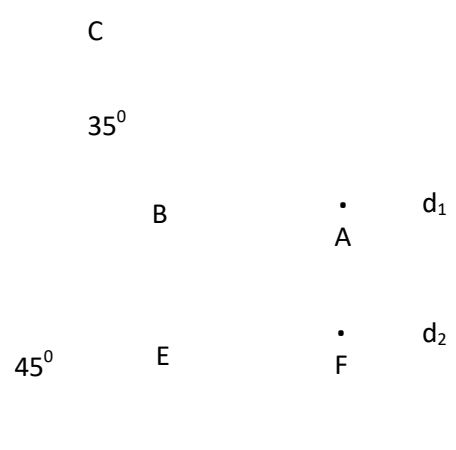


16. Given that triangle ABC and DEC are right triangles such that $3DE = 2AB$. What is the ratio of areas of triangles ABC and DEC ?



- A) $2/3$
- B) $3/2$
- C) $4/9$
- D) Not possible

18.



In the figure $d_1 \parallel d_2$, what is $\angle CBA + \angle DEF$?

- A) 225°
- B) 240°
- C) 250°
- D) 260°

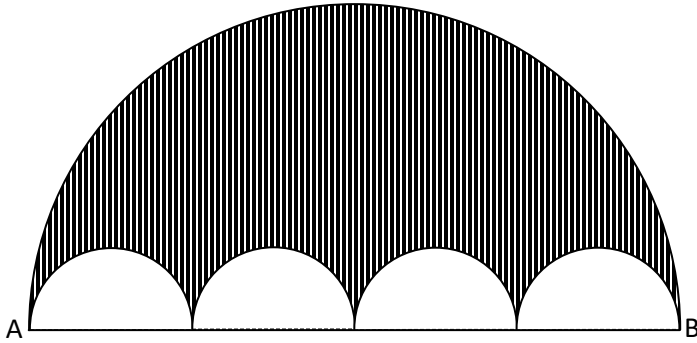


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19. Four identical semi-circles are drawn inside the semi-circle with diameter AB in the figure such that $AB = 8\text{cm}$. What is the perimeter of the figure bounded by five semi-circles? ($\pi = 3$)



- A) 30
- B) 24
- C) 15
- D) 12

20. In the figure, A_1 is the area bounded by a square and a quarter circle with center a vertex of the square. A_2 is the area bounded by the square and the circle. What is the ratio of A_1 to A_2

A_2

A_1

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NUMBER THEORY

21. How many digits does $(10^{10})^2$ have?
- A) 20
 - B) 21
 - C) 100
 - D) 1001
22. Two positive integers are added up to 12. If you add two other integers to 12 you will get 19. How many of these four integers are odd at most?
- A) 2
 - B) 3
 - C) 4
 - D) 5
23. Ali adds last digits of two numbers and produces another digit. For example, if initial digits are 2, 8 then the sequence is continued as follows 2,8,0,8,8. What is the 2017th digit of the sequence starting with 3, 4?
- A) 9
 - B) 2
 - C) 1
 - D) 3
24. How many numbers from 10 to 40 divisible by the product of its digits ?
- A) 9
 - B) 7
 - C) 5
 - D) 3

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25. My mother age is a two digit number, which is power of 7 and my father's age is a two digit number which is a power of 2. The sum of the digits of their ages is an odd number. What is the sum of their ages?
- A) 113
B) 100
C) 81
D) 65
26. 5- digit number 735AB is divisible by 7, 8 and 9. Which one of the following numbers is divisible by 2-digit number AB?
- A) 158
B) 234
C) 252
D) 316
27. X is a natural number, y is the sum of x number's digits, z is the sum of y number's digits. If $x + y + z = 60$, what is the sum of different values of x ?
- A) 140
B) 141
C) 143
D) 144
28. n is a natural number and p is a prime number. If $n + \frac{p}{n} = q^2$, how many (n , p) are there?
- A) 0
B) 1
C) 2
D) 3

29. $4abcdef7$ has 8-digits. The sum of any consecutive 3-digits of this number is 16. What is the sum of digits of this number?

- A) 40
- B) 41
- C) 42
- D) 43

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30. $\frac{11223344556677889900}{11} = A$
How many digits does A have?

- A) 10
- B) 13
- C) 17
- D) 19

COMBINATORICS

31. The total weight of a tank is $2x$ tones when it is full. If the tank is one-third filled, then it weighs 6 tones. What is the weight of the tank?
- A) $9 - x$
B) $2x - 18$
C) $2x - 9$
D) $x + 9$
32. Two workers; Secretary and Typist are doing three different tasks which are calling, typing and filing documents. Each task takes one hour. At least how much time can they spend to finish these jobs?
- A) 0.5
B) 1
C) 1.5
D) 2
33. In a car race, 216 cars enter a 100-meter competition. The track has 10 lanes, so maximum 10 cars can compete at a time. At the end of each race only one car is the winner and the other are eliminated and the winner will compete again in a later race. How many races are needed to determine the champion?
- A) 25
B) 26
C) 27
D) 210
34. Is it possible to form four-faced regular (all faces are identical) tetrahedron using a wire with length 6cm? You cannot cut the wire. Just bend.
- A) yes
B) no
C) possible
D) lack of information

35. How many integers between 1000 and 1999 have three same digits ?

- A) 34
- B) 42
- C) 72
- D) 12

37. How many right triangles are there in the figure if two horizontal line segments are parallel to horizontal side and two vertical line segments perpendicular to horizontal side of the triangle?

- A) 5
- B) 6
- C) 7
- D) 8

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36. In a heptagon (7-sided polygon) ABCDEFG, a triangle BDF is drawn. Arafa is coloring the vertices under the condition that no edge will have same colored vertices. What is the minimum number of different colors to be used?

- A) 6
- B) 5
- C) 4
- D) 3

38. Tariq and Brian play a game such that they choose a number from a set = {1,2,3, ... , 100} in turn. Each player can choose only one number in one turn. If Tariq starts first, is there a possibility for him to win?

- A) yes
- B) no
- C) impossible
- D) lack of information

39. A Jeweler is trying to make a necklace out of beads. The beads have different colors. How many different necklaces can she make if she has 4 beads and wants to use all of them?

- A) 3
- B) 4
- C) 5
- D) 6

40. Thomas has four rabbits to place at the end points of four intersecting line segments as shown in the figure. If a rabbit jumps at once, it will arrive at the intersection point. Is it possible that these rabbits stand at the intersection points which form a triangle? Explain your reason

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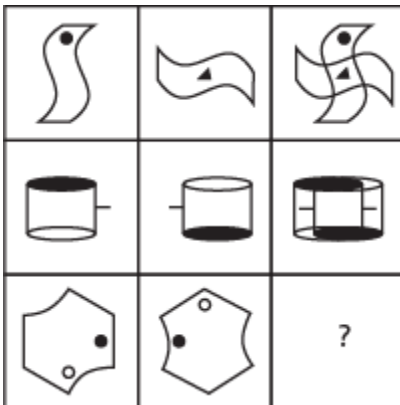
IQ QUESTIONS

41.



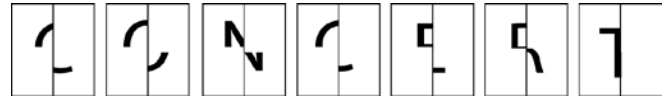
- A) B) C) D)

42.



- A) B) C) D)

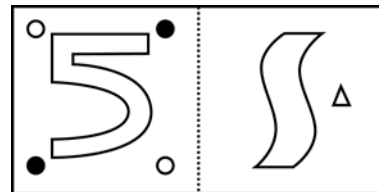
43. Which word is it?



- A) OCNCERT
 B) CONCERT
 C) CONCEET
 D) CONCR

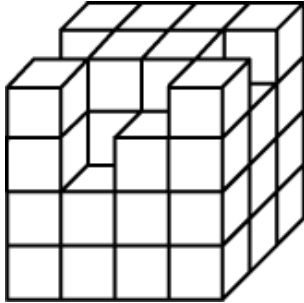
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44. When the figure is folded along dotted line, what figure can it be?



- A) B) C) D)

45. How many cubes are there in the figure?



- A) 43
- B) 44
- C) 45
- D) 46





47. B C D F G H J ?

- A) K
- B) L
- C) M
- D) N

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46. Which of the following figure completes the empty spaces?

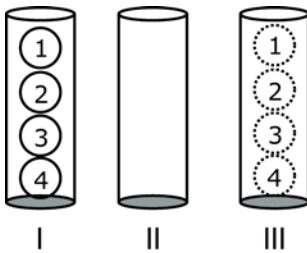


- A) 
- B) 
- C) 
- D) 

48. You want to cook some food in the kitchen. But the kitchen is full dark. You have a candle, a cooker and a box of match which has only one match in it. You have only one chance. Which one you are going to light as you enter the kitchen?

- A) The match
- B) The cooker
- C) The candle
- D) none

49. We want to carry balls in the box I to box III in the same order. We can take only one ball at the same time and we can use box II for storing them. At least in how many turns can we carry them?



- A) 5
- B) 6
- C) 7
- D) 8

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50. You should place the given numbers 1,2,3,5,7,9 into the box so as to make the sum equal to A in all directions. Find the number should be placed in question mark? Write your solutions in the answer sheet

